

No. 785,085.

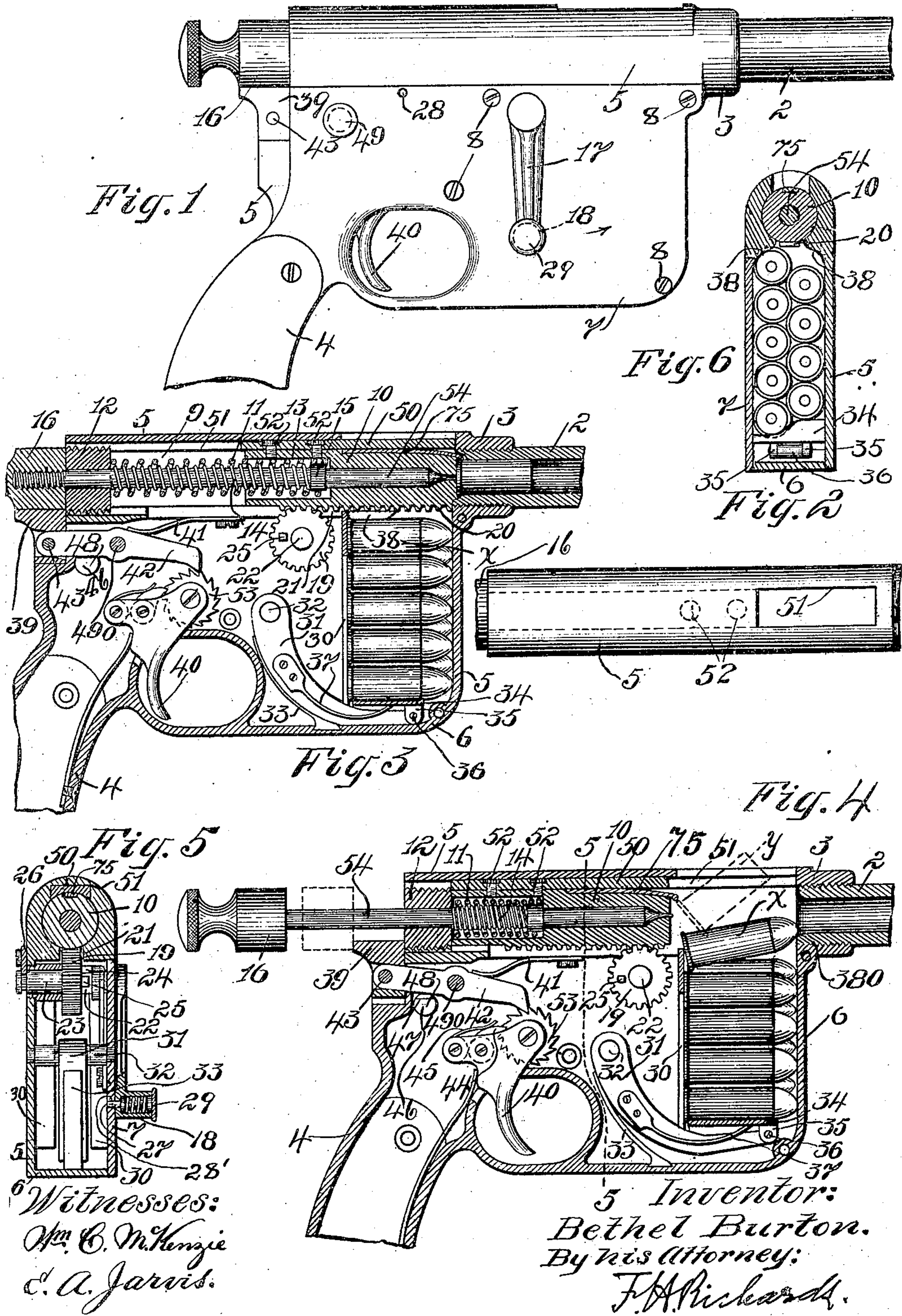
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AUTOMATIC FIREARM.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC FIREARM.

SPECIFICATION forming part of Letters Patent No. 785,085, dated March 21, 1905.

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To all whom it may concern:

Be it known that I, BETHEL BURTON, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Firearms, of which the following is a specification.

This invention relates to that class of magazine-firearms in which the reaction or recoil of the exploding cartridge is utilized to push the bolt or breech-block back to a position such that a new cartridge may be forced into the barrel and simultaneously with such action the empty shell is caused to be ejected from the firearm.

The present improvements relate more particularly to the provision of means for preventing injury to the actuating spring or springs of the bolt, which means is in the present instance in the nature of a fixed stop positively determining the backward or withdrawn position of the bolt.

The present improvements also include as one of its features a lever mechanism for facilitating the manual retraction of the bolt in opposition to the force of its actuating spring or springs when it is desired to charge the magazine of the firearm.

A firearm constructed in accordance with the present improvements also embodies a device for positively locking at will the firing-pin in its cocked position, together with certain other details of construction and organization, all of which, in addition to those hereinbefore specifically referred to, are set forth in the accompanying drawings, in which—

Figure 1 is a side elevation of a firearm embodying the present improvements with a part of the barrel and the handle or grip thereof broken away. Fig. 2 is a top or plan view of a portion of the firearm illustrated in Fig. 1. Figs. 3 and 4 are longitudinal sectional views, the former figure illustrating the position of the parts after the bolt has been thrown forward and a cartridge forced into the barrel of the firearm and exploded, while the latter figure shows the position of the parts upon the withdrawal of the bolt by the recoil of the

exploded cartridge, the shell of this latter being shown in a position in which it has been forced out of the barrel and is being ejected. Fig. 5 is a cross-sectional view on the line 5 5 in Fig. 4. Fig. 6 is a similar view taken just within the frame in front of the cartridges and looking from right to left, certain parts beyond the plane of the section being omitted.

Similar characters of reference designate corresponding parts in all figures.

The present improvements are disclosed in the drawings attached to the present specification as applied to a pistol, (although the same are applicable to rifles and firearms generally,) the barrel 2 of which is screw-threaded to engage with a boss or head 3 of the frame of the firearm, while the grip or handle thereof is designated by 4.

In the manufacture of a firearm in accordance with my present improvements I prefer to form the frame 5 thereof by some suitable method or process to constitute a block having within the same one or more recesses or cavities for the reception of the cartridges and the various operative parts and of a desired conformation. Around the outer boundary of the frame is a flange, such as 6. After the various parts have been assembled they may be secured in place by side plate 7, affixed to the remainder of the frame by means such as screws 8. In a guide-opening 9 of the frame is mounted a reciprocative bolt or breech-block 10, movable to and fro in line with the axis of the barrel and urged forwardly by a spring, such as 11. One of the principal features of the present improvements relates to the provision of a fixed stop for determining the extreme rearward position of the bolt, and thereby preventing too great a compression of the actuating-spring 11 under the reactive forces of the exploding cartridge—that is, the extent or amount to which such spring may be shortened by compression. This stop is in the nature of an abutment 12, having a threaded engagement with the frame at the end of the guide-passage 9 and against which one end of the spring 11 abuts. The cooperative face upon the bolt adapted to engage

with this stop is formed by the adjacent end face of the former. The bolt has an axial recess 13, and into this recess the spring 11 extends, the latter being seated against the bottom of the recess and the recess being of a depth such that when the bolt is thrown backward until arrested by the stop 12 the spring 11 will not be compressed to an extent liable to impair its continued satisfactory working.

Mounted to slide longitudinally in an opening in the stop 12 and in an aligned opening in the bolt 10 is a firing-pin 54, encircled by its actuating-spring 14, interposed between the aforesaid stop 12 and a collar 15 on the pin, the spring being of a sufficient external diameter to permit it to work within the inclosing bolt-actuating spring 11. The extreme forward position of the firing-pin (relatively to the bolt) under the tension of its actuating-spring is determined by the contact of its collar 15 with the bottom of the axial recess 13 of the bolt. Exteriorly of the stop 12 a head 16 is secured to the firing-pin, this head being adapted to cooperate with a sear in a manner that will be presently adverted to.

Referring now to the means for manually drawing the bolt backward from the end of the barrel when it is desired to charge the magazine, a hand-lever 17 is mounted exteriorly of the frame, the same being provided with a finger-piece or handle 18 and serving to rotate a pinion 19, journaled in the side portions of the frame and engaging with a rack 20, formed on the lower face of the bolt and sliding to and fro in a groove 21 of the frame. Although the lever 17 serves to actuate the pinion 19, the shafts of the two are not permanently secured together; but motion is communicated from the shaft 22 of the lever to the shaft 23 of the pinion through the medium of a pair of lugs, one lug, 24, being fixed relatively to the lever 17 and another lug, 25, extending from the radial face of the pinion across the path of movement of the former.

The shafts of the lever and pinion may be mounted in any proper way in the frame. Suffice it here to say that the shaft of the pinion may be provided with an annular recess, into which extends a keeper 26, affixed to the frame. The lugs 24 and 25 are so related to each other and the diameter of the pinion 21 is such that the rotation of the handle 17 in a counter-clockwise direction in Fig. 1 to an extent less than a full rotation will accomplish the full backward movement of the bolt, and when the bolt is in this retracted position an opening is exposed for the insertion of cartridges into the magazine. In order to positively retain the bolt in its withdrawn position after rotating the handle 17, there is provided a spring-actuated pin 27, adapted to enter an opening 28 in the side plate 7 of the frame. This spring-pressed pin may be withdrawn to free the lever by a finger-piece 29.

Directly below the opening made by the with-

drawn bolt is a space designed to receive the cartridges and constituting the magazine-chamber of the firearm. The width of this space measured transversely of the frame is somewhat less than the sum of the diameters of two cartridges, and hence when the magazine is charged the cartridges will assume a staggered arrangement, it being designed in the discharge of the firearm that the cartridges shall ascend and be pushed forward into the barrel alternately from the opposite sides of the magazine-chamber. The dimensions of this chamber measured lengthwise of the cartridges therein is substantially equal to the longitudinally over-all measurement of the cartridges, the bullet-heads of the latter sliding along the front portion of the flange 6 of the frame and the flanged ends of the cartridge-shells sliding along a pair of upright strips 30 30, attached to the opposite side plates of the frame, leaving a sufficient space between their longitudinal edges for the movement of an elevating-arm 31, fulcrumed to a cross-pin 32 and pressed upward by a spring 33, secured at one end to the frame and at the opposite end bearing against such arm. The cartridges rest upon the carrier 34, to lugs 35 of which the elevating-arm 31 is pivoted by a pin, such as 36. This carrier-plate is preferably channeled or grooved to form a proper seat for the lowermost cartridges at opposite sides of the magazine-chamber, and in order to maintain them in a substantially horizontal position (assuming the barrel of the firearm to be in a similar position) a spring 37 is secured at one end to the arm 31 and at the opposite end bears against the carrier at one side of the pivotal connection thereof with the arm. At the top of the chamber and immediately below the rack on the bolt is a pair of plates 38, similar in width and disposition to the aforesaid plates 30 30. They are curved on their under surfaces to cause the cartridges, which come in contact with them alternately first on one side and then on the other under the force of the spring 33, to slide toward the axial vertical plane of the barrel and assume a position in which the flanged end or base of the cartridge projects upward in the space between the plates. This is the position taken by the cartridge, (marked X in Fig. 4.) The uppermost cartridge of the number within the magazine is permitted to take such position immediately upon the withdrawal of the bolt responsive to the recoil of the exploded cartridge within the barrel, and it is caused to do so by virtue of the force of the spring 33. When the bolt thereupon moves forward under the force of its actuating-spring, the forward end of the bolt contacting with the base of the cartridge pushes the latter forward, and by reason of the fact that the lower surface at the rear of the bore of the barrel is inclined (see portion marked 380)

the forward movement of the bolt causes the cartridge to rise and move forward simultaneously until when the bolt shall have taken its farthest forward position the cartridge will be properly positioned in the barrel ready for firing.

Referring now to the firing mechanism, the sear comprised therein and designated by 39 is mounted in guideways at the base of the frame to move toward and away from the axis of the firing-pin. It is of such form and construction as to cause it to project into the path of movement of the aforesaid head 16 of the firing-pin when the sear shall have assumed its position nearest the firing-pin. From this position it is withdrawn in the act of firing to release the head 16 and free the firing-pin, which is thereupon thrown forward by its actuating-spring 14 and its firing end caused to strike and explode the cartridge.

The usual trigger for releasing the sear is designated by 40, the same being located in an opening in the frame, which latter extends entirely around such opening and constitutes the trigger-guard. The normal position of the sear corresponding to the forward position of the trigger and in which the sear projects across the path of the head 16 (the head so engaged by the sear being shown in dotted outline in Fig. 4) is assured by a sear-spring 41, which presses against a lever 42, fulcrumed intermediate its ends, as by a pin 490. One end of this lever is pivoted by a pin 43 to the sear, while the opposite end of the lever is adapted to cooperate with a toothed wheel 53, whose pivotal axis coincides with the axis of the fulcrumed spring-pressed trigger-lever. The backward movement of the trigger upon being pressed by the finger serves to shift the toothed wheel 53 forward a step through the medium of a pawl 44, mounted on the trigger-lever and pressed by a spring 45 into engagement with the teeth of the wheel. In the position of the lever 42 in which the end cooperative with the toothed wheel 53 is seated in the space between contiguous teeth the rearward end of the lever is elevated to its highest position under the action of the sear-spring 41, this position of the parts corresponding to the cocked position of the mechanism. When, however, the trigger is pulled backward, the aforesaid end of the cooperative lever 42 riding up upon the tooth immediately at the rear depresses the rearward end of the lever 42 and releases the firing-pin, which thereupon fires the cartridge in the barrel. In order to maintain the parts in such cocked position and lock the trigger from firing movement, I have provided an adjustable locking device in the nature of a cross-pin 46, journaled in the frame and having a portion 47 of relatively less radius than the portion 48. This locking-pin exteriorly of the frame is provided with a finger-piece 49, enabling the pin to be turned to bring the portion 48 under the lever 42. The

latter is then incapable of permitting its said cooperative end to be shifted from one tooth to the other of the toothed wheel 53. When, however, the pin is shifted to bring the reduced portion 47 thereof under the lever 42, the latter is free to swing upon its support under the action of the rotated wheel 53.

The extractor for insuring the withdrawal of the cartridge-shell from the barrel of the firearm as the bolt recedes from its forward position is designated by 75, the same being secured to the bolt in such a position as to permit its free end to spring over and engage with the flanged end or base of the cartridge-shell, and thus enable it to pull the shell backward with it. Preferably means will be provided for closing that opening through which the emptied shell is ejected at such times as the cartridge is fired, although leaving an opening clear for the passage outward from the firearm of the shell when the latter is withdrawn from the barrel by the receding bolt. Means disclosed in the drawings for accomplishing the alternating closing and opening of this space immediately forward of the withdrawn bolt consists of a closure or cover plate 50, adapted to slide to and fro in a guideway 51 along the top of the frame. This closure-plate is in this instance secured by screws, such as 52, to the bolt, the plate being of such dimensions as to engage with the forward wall or end of the guideway when the bolt is in its position farthest forward.

In operation the lever 17 is first released by withdrawing the spring-pressed pin 27, when it may be rotated counter-clockwise to withdraw the bolt from the end of the barrel and shift the closure-plate 50 backward to expose the opening into the magazine-chamber. Cartridges may then be fed thereinto from a clip or otherwise onto the plate 34, which is gradually forced downward against the tension of the spring 33 as the cartridges are pressed into the magazine. When such chamber is charged to a sufficient extent, the pin 27 is again withdrawn from the temporary holding-recess 28 and the bolt permitted to move forward, which movement is accompanied by the entrance of the uppermost cartridge into the barrel. The bolt having reached its position farthest forward, the movement of the lever-arm 17 may be continued through a further angle to bring its spring-pressed pin over the permanent locking-recess 28', thus freeing the lugs 24 and 25 and permitting the pinion 19 to rotate freely as it reciprocates under the action of the exploding cartridges and the actuating-spring of the bolt. Assuming that the adjustable locking-pin 46 is in a position to free the lever 42, whose rearward end is held in an elevated position by the sear-spring 41 to intercept the collar or head 16 on the firing-pin, the firearm is now ready for operation. Upon pulling the trigger 40 the sear is depressed, as will be readily understood from

the foregoing description, and the firing-pin springing forward under the action of its spring 11 fires the cartridge. When this latter action has occurred, it is not contemplated, however, that the collar 15 on the firing-pin shall have contacted with the bottom of the recess in the bolt, but that a slight space between the opposed surfaces shall still exist. When now the bolt is thrown backward by the force of the recoil, the empty cartridge-shell accompanies it in its backward movement until its front edge reaches the rear edge of the bore of the barrel. The firing-pin-actuating spring is now free to urge the firing-pin forward the remaining distance, turning the cartridge-shell around the free end of the extractor as a fulcrum into the position, for example, indicated by dotted outline Y in Fig. 4. This action, in conjunction with the pressure on the shell exerted by the upwardly-tending cartridge immediately beneath, serves to flip the shell upward and eject it. Simultaneously with this ejection of the emptied shell the next cartridge is caused to protrude into the path of the bolt, which latter upon its forward movement pushes the cartridge into the barrel in the manner already explained.

Having thus described my invention, I claim—

1. In a firearm, the combination with a reciprocative breech-bolt provided with a rack, of a spring for automatically returning the bolt when thrown back by the discharge of the cartridge, a pinion meshing with the rack on the breech-bolt and free to run idly during the automatic reciprocation of the bolt, a lever-arm for rotating the pinion and thereby drawing back the bolt against the pressure of the spring, a lug fixed relatively to said pinion, and a lug adapted to engage with the pinion-lug, and which is fixed relatively to said arm.

2. In a firearm, the combination with a reciprocative breech-bolt provided with a rack, of a spring for automatically returning the bolt when thrown back by the discharge of the cartridge, a pinion meshing with the rack on the breech-bolt, a lever-arm for rotating the pinion and thereby drawing back the bolt against the pressure of the spring, a clutch for connecting the lever with and disconnecting it from the pinion, a lug fixed relatively to said pinion, and a lug adapted to engage with the pinion-lug, and which is fixed relatively to said arm.

3. In a firearm, the combination with a reciprocative breech-bolt provided with a rack, of a spring for automatically returning the bolt when thrown back by the discharge of the cartridge, a pinion meshing with the rack on the breech-bolt, a lever-arm for rotating the pinion and thereby drawing back the bolt against the pressure of the spring, a clutch for connecting the lever with and disconnecting it from the pinion, a releasable detent for hold-

ing the lever, a lug fixed relatively to said pinion, and a lug adapted to engage with the pinion-lug, and which is fixed relatively to said arm.

4. In a firearm, the combination of a reciprocative bolt provided with a rack, a pinion engaging with the rack, a lever-arm for rotating the pinion, a lug fixed relatively to said pinion, and a lug adapted to engage with the pinion-lug and which is fixed relatively to said manually-operated lever-arm.

5. In a firearm, the combination of a frame, a reciprocative bolt provided with a rack, a pinion engaging with the rack, a lever-arm mounted exteriorly of the frame, for rotating the pinion, a lug fixed relatively to said pinion, a lug adapted to cooperate with the pinion-lug and which is fixed relatively to said lever-arm, and a spring-pressed locking-pin mounted on said lever-arm and adapted to be seated in a locking-recess in said frame.

6. In a firearm, the combination with a frame of a reciprocative bolt provided with a rack, an actuating-spring therefor, a stop for determining the extreme rearward position of the bolt, and a rack and pinion for manually retracting the bolt.

7. In a firearm, the combination of a reciprocative bolt provided with a rack, a restoring-spring therefor, a stop for determining the extreme rearward position of the bolt, a pinion engaging with the rack, a lever-arm for rotating the pinion, a lug fixed relatively to said pinion, and a lug adapted to engage with the pinion-lug and which is fixed relatively to said lever-arm.

8. In a firearm, the combination of a reciprocative bolt provided with a rack, a pinion engaging with the rack, a lever-arm for rotating the pinion, a lug fixed relatively to said pinion, a lug adapted to engage with the pinion-lug and which is fixed relatively to said lever-arm, a stop for determining the extreme rearward position of the bolt, a restoring-spring for the bolt interposed between the bottom of a recess in said bolt and said stop, a firing-pin provided with a shoulder and slidably mounted in the bolt and in the stop, and an actuating-spring for the firing-pin interposed between said shoulder and said stop.

9. In a firearm, the combination of a frame, a reciprocative bolt provided with a rack, a pinion engaging with the rack, a lever-arm mounted exteriorly of the frame for rotating the pinion, a lug fixed relatively to said pinion, a lug adapted to cooperate with the pinion-lug and which is fixed relatively to said lever-arm, a spring-pressed locking-pin mounted on said lever-arm and adapted to be seated in a locking-recess in said frame, a stop for determining the extreme rearward position of the bolt, a restoring-spring for the bolt interposed between the bottom of a recess in the bolt and said stop, a firing-pin provided with a shoulder and which is slidably mounted in

the bolt and in the stop, and an actuating-spring for the firing-pin interposed between said shoulder and said stop.

5 10. In a firearm, the combination of a reciprocative bolt provided with a rack, a restoring-spring therefor, a stop for determining the extreme rearward position of the bolt, a pinion engaging with the rack, a lever-arm for rotating the pinion, a lug fixed relatively to said
10 pinion, a lug adapted to engage with the pinion-lug and which is fixed relatively to said lever-arm, a sear, and a rotative pin adjustable from the exterior of the frame for locking the
15 sear at will against action.

11. In a firearm, the combination of a reciprocative bolt provided with a rack, a pinion engaging with the rack, a lever-arm for rotating the pinion, a lug fixed relatively to said
15 pinion, a lug adapted to engage with the pin-

ion-lug and which is fixed relatively to said lever-arm, a stop for determining the extreme rearward position of the bolt, a restoring-spring for the bolt interposed between the bottom of a recess in said bolt and said stop, a firing-pin provided with a shoulder and
25 which is slidably mounted in the bolt and in the stop, an actuating-spring for the firing-pin interposed between said shoulder and said stop, a sear, and a rotative pin adjustable from the exterior of the frame for locking the sear
30 at will against action.

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 12th day of January, 1903.

BETHEL BURTON.

Witnesses:

FRED. J. DOLE,

JOHN O. SEIFERT.